

NASA TECH BRIEF



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Inhibited 1, 1, 1-Trichloroethane Replaces Trichloroethylene for Degreasing

In the fight against air pollution, certain communities have placed tight limitations on the amount of trichloroethylene (spec. MIL-T-27602) permitted to escape from degreasing plants. The liquid, used in vapor condensation degreasing and hot or cold flushing processes, is a photochemically reactive solvent which, when released in the atmosphere, causes irritation to the eyes. A practical substitute for this material is inhibited 1,1,1-trichloroethane (methyl chloroform), TCE, which has only slight photochemical activity and causes little irritation to the eyes.

In the past, the use of TCE for vapor condensation degreasing was discouraged because of the inadequacy of the inhibitors and the presence of chlorinated impurities. Through better processing controls and improved inhibitors, these shortcomings have been largely eliminated. For instance, the liquid should be at least 93% trichloroethane by volume, the chlorinated impurities should not amount to greater than 1% by volume, and no single chlorinated impurity should amount to more than 0.5% by volume.

The use of TCE (Rocketdyne spec. RB0210-020; North American Rockwell spec. ST021GB0002) should only require that present process specifications be amended. Both trichloroethylene and TCE are non-corrosive; both are compatible with normal construction materials when used under similar conditions; both have approximately the same hydrocarbon dissolving power (kauri-butanol number); and both have the same effect on hardware cleaned by or exposed to them. In addition, TCE is less toxic than trichloro-

ethylene and can withstand production loads and conditions, or long-term storage, without degradation.

Test results confirm these characteristics. During a four-month study of TCE in use, the liquid was monitored in the boiling sump, the condensate tank, and the reclamation still. Measurements were taken for pH, acid acceptance, water content, boiling temperatures, and contents of inhibitors and trichloroethane. Additional tests were made to define safety limits and chemical reactivities, and to establish analytical procedures.

Full instructions are available for process control and for corrective action to be taken in the event that the TCE varies from the required properties while in use. Tests and methods of sampling and analysis are prescribed.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
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No patent action is contemplated by NASA.

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